

# The Weed Saver

While the farm crew struggles to kill every weed possible, Ruth Mangum often steps in to save some.

Last summer, the weed scientist actually planted pigweed, irrigated it, and hand-pulled other weeds so they couldn't out-compete it. "The nice thing about growing weeds is that they don't need to be fertilized," Mangum says. She does feel a little guilty about the pigweed escapees that will plague researchers who use her one-time pigweed field for years to come. "I did my best, but you can't prevent every seed from falling," she says.

This year marks Mangum's 23rd year as weed "librarian" for the Agricultural Research Service in Beltsville, Maryland. She curates one of the oldest and most extensive weed seed collections in the United States. Most of the collection's 290 seed lots—representing 71 weed species and stored in freezers in small plastic containers—come from the usual uninvited weeds, like crabgrass and chickweed, that sprout everywhere, including the 7,000-acre Henry A. Wallace Beltsville Agricultural Research Center where she works. The rest were shipped to her from ARS labs in the South and West.

"We like to have a pint of seed for each seed lot. These fit in one to three containers, depending on how large or small the seeds are," Mangum says. "Some, like purslane, are like specks of dust, while others are much bigger, like wild morning-glory seeds, which are about one-eighth inch long." She either strips the seeds from weed plants in the field or brings the whole plant in and dries it on paper in the greenhouse. "Then we have a machine for cleaning the seeds, and we sieve them after cleaning to filter out any debris," Mangum says.

**Using a seed counting device, plant physiologist Ruth Mangum prepares foxtail, *Setaria*, weed seeds for a greenhouse experiment.**

Mangum, an ARS plant physiologist, learned from colleague Ray Taylorson—who started the collection in the 1960s and retired in 1990—that the best way to fight

weeds is to know them. Taylorson taught her that "there are only two basic ways to deal with weeds," she says. "Get all the seeds in the soil to sprout at the same time, and then kill the weeds in one fell swoop, or stop the seeds from sprouting in

A patch of Canada thistle, *Cirsium arvense*, a particularly troublesome perennial weed throughout the United States.

## ARS Scientist Preserves Weeds Others Want Gone

the first place.” To do either, Taylorson had to learn what makes seeds sprout after they lie dormant for a year or more. Dormancy is a complicated process that depends on many internal and external factors.

Continuing Taylorson’s work, Mangum, weed scientist John Teasdale, and colleagues at the ARS Sustainable Agricultural Systems Laboratory are studying how seed dormancy and other aspects of weed biology are affected by light, temperature, and various farming practices. “The seeds we collect have different dormancy periods based on the conditions their parent plants grew under,” Mangum says. “Their response to their environment as well as to control practices will determine their ultimate spread or decline in agricultural as well as natural systems. Our research focuses on understanding the dynamics of weed populations in response to various agricultural practices, including herbicides, tillage, crop population and spacing, cover crops, and rotations. The weed characteristics we’re studying include germination, emergence, competition for resources, seed production, seed survival, and spatial distribution.”

Last summer Mangum grew samples from all 30 pigweed seed lots. She sent them to an outside expert to verify their identifications, since mistakes are easy to make with plants that look alike—even to experts and plant librarians. It is important to positively identify species thought to be tolerant to some major herbicides—a potential threat to farmers.

“The biggest surprise we got was that a lot of hybrids were created by natural cross-breeding of pigweed in the field, something this expert told us was quite common,” Mangum says.

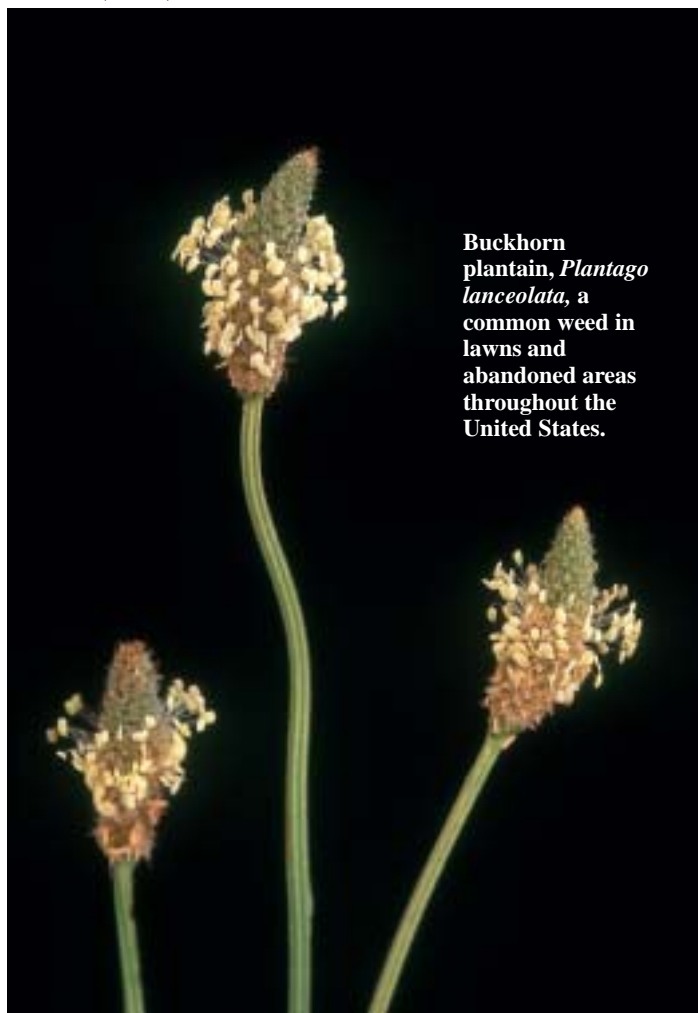
Mangum plants weed seeds not only for identification but also for testing their viability and for research both in the field and in the greenhouse. Researchers at Beltsville, for example, use the weed seeds in tests of vinegar as a herbicide, studies of global warming effects on weeds, and evaluations of various cover crops for their ability to suppress weed sprouting and growth.

The weed librarian says the farm crew has grown used to her interest in weeds and always honors her request to save favored patches of them.—By **Don Comis**, ARS.

*This research is part of Integrated Farming Systems (#207) and Crop Protection and Quarantine (#304), two ARS National Programs described on the World Wide Web at [www.nps.ars.usda.gov](http://www.nps.ars.usda.gov).*

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PEGGY GREB (K10653-1)



**Buckhorn plantain, *Plantago lanceolata*, a common weed in lawns and abandoned areas throughout the United States.**

PEGGY GREB (K10607-1)



**Plant physiologists Ruth Mangum and John Teasdale examine pigweed, *Amaranthus*, seedheads grown from different seedlots from their weed seed collection.**